

Aurobay

FESTO

Specification for

- Aurobay plant in Skövde (Sweden)
- Zhangjiakou (China)



Festo components for pneumatics,
electro-pneumatics and local control

Version 1.0

Date	13.05.2024
Creator	Thorsten Weiß
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2 Document Change Information

Version	Date	Type of Changes	Name	Page / Chapter
1.0	13.05.2024	First edition	Peter Görrel + Thorsten Weiß / Festo	all

Legend:

-  = xDKI-Online Link
-  = Documentation
-  = CAD
-  = Data Sheet
-  = Accessories
-  = Spare Parts
-  = Support Portal

3 Contact Person

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4 General Information

This specification defines products and automation concepts which are state of the art and ensure the availability worldwide. The availability of products includes offering additional services to Aurobay.

The named contact persons are to be contacted as soon as possible during the start-up phase of the project, to determine the quantity of components to be used and together secure delivery time setup in the project.

Documentation of products and software is in English language available, also in other languages.

Nomenclature should be the same on pneumatic and electric drawings, label holder should be reference designation. Labelling should be done in drawing and on the tube.

If any conflicts occur, then specific and direct discussions must take place with Aurobay/Pneumatic supplier and written permission for any deviations must be obtained.

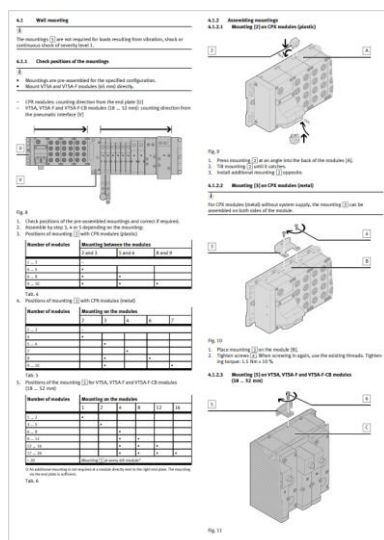
All accessories for cylinders and valves are allowed, please see Festo main catalogue.

4.1 Valve terminals

Valve terminals must be rigidly mounted.

Valve terminals must be mounted, and earth grounded according to the Festo installation mandatory requirements.

See also additional information at the support portal from Festo:



[Assembly instructions CPX-MPA](#)



[Assembly instructions CPX](#)

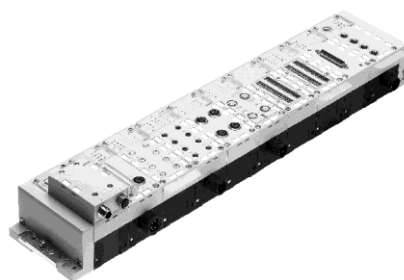


[Assembly instructions MPA](#)

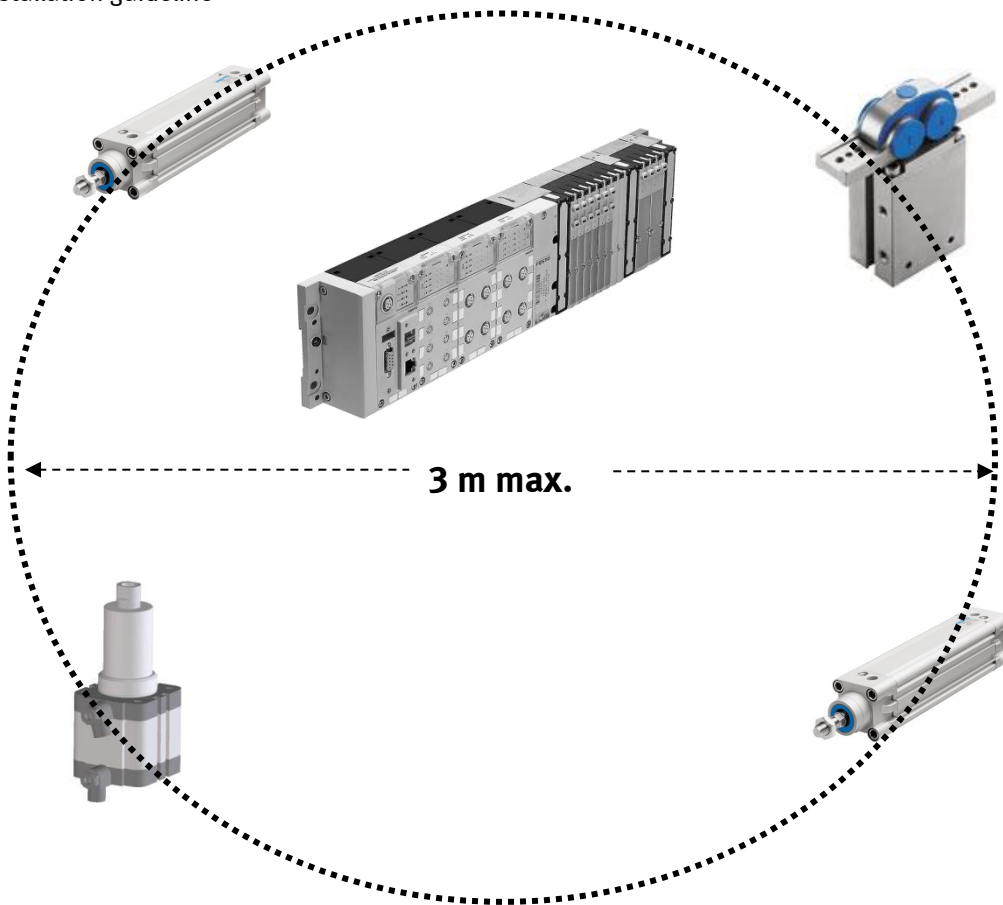


Valve terminals (VT) must be used for piloting pneumatic actuated cylinders, clamps, or other devices. The specified type of VT is the Festo MPA with CPX electrical I/O devices. When use big cylinders, diameter 160 and bigger, use two valves on the valve terminal as first choice, second choice pilot valve near the cylinder.

4.1.1 Valve terminals, with CPX MPA



4.1.2 Installation guideline



Consideration to Aurobays demands of cycle times and availability, when configuring valve terminals must be taken. The VT must be installed as near as possible to the pneumatic actuators to prevent long tubes and to optimize installation costs as well as short cycle times.

4.1.3 Connection definitions

Electrical connection type: M12

4.1.4 VT design

VT's must be defined that 10% of the maximum numbers of I/ O and one blanking plate for a valve are free during first installation and SOP.

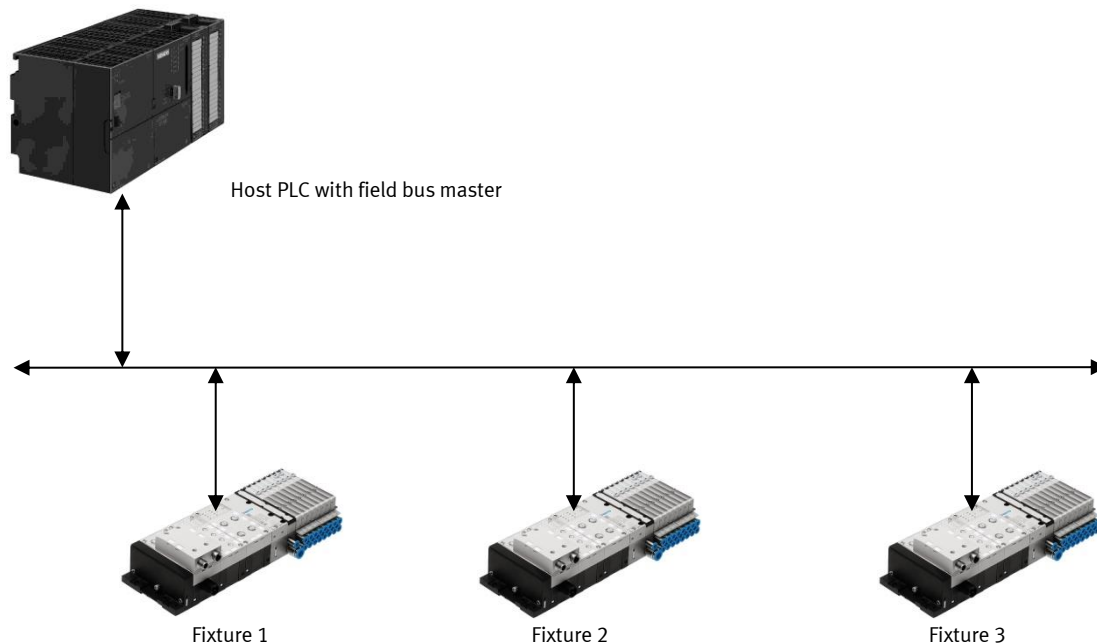
4.1.5 Recommend standard configuration for VT in fixtures

No. of electrical input modules:	6 (max.10)
No. of pilot valves:	8 x 5/2 bistable (max.16)
Controller / field bus:	1

Service units

4.1.6 Electrical connection of VT

Standard connection of VT to a Host PLC is via a standard field bus, according to project specification:



4.2 Service units

The pneumatic system must be dimensioned to have full function at a system pressure of 5 bars. The quality of the compressed air must meet at least ISO 8573:1 class 5.

The compressed air must be connected by an air preparation unit equipped with:

- manual cut off valve with venting (lockable with padlock)
- filter (manual vapour draining)
- regulator
- manometer
- soft start valve
- venting valve (automatic)
- pressure switch

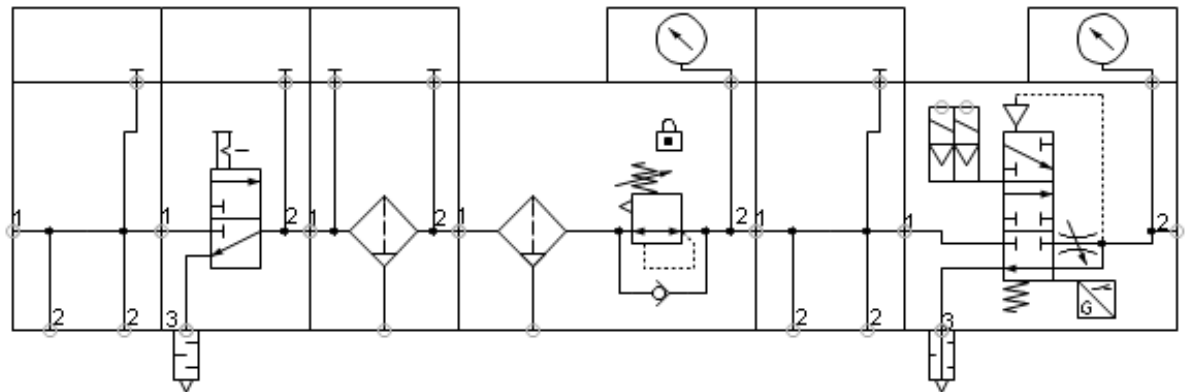
The main valve must be marked with a sign. Signs specifying the pressure to be set must be displayed in all places where the pressure can be adjusted.

Cylinders of dimension 8-25mm are to be made according to ISO 6432. Cylinders of dimension 32-320 mm are to be made according to ISO 6431 and VDMA 24562.

At emergency stop, the whole system must be aired off. The emergency stop function must however not stop a machine function, where the stoppage may cause personal injury or equipment damages.

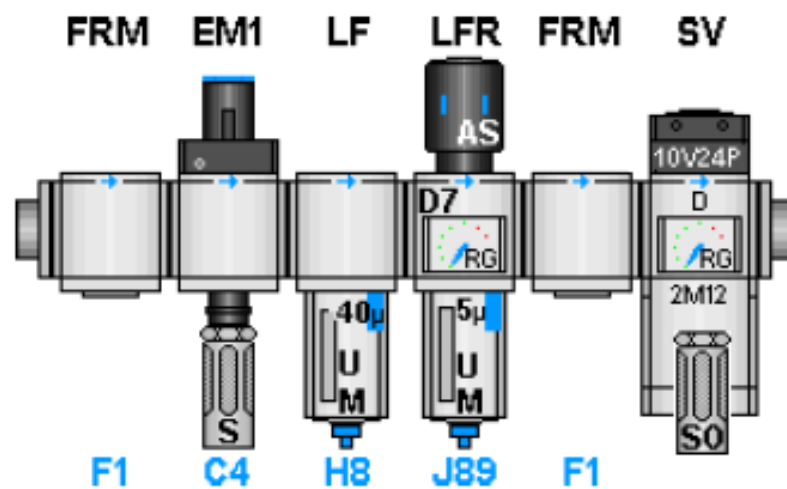
When an adjustment level is given, this must be given as a max – min levels, not only a single value.

Part number: **MS6-3/4" – SE_CS.1482619-D** (see page 41)



This service unit has performance level PLd.

Service unit combination with FRM, on-off valve with silencer, filter 40µm, filter regulator 0,5-12 bar, 5µm, metal bowl with manual condensate drains, with soft-start, exhaust valve.



This service unit is also available in performance level PLe with project number SE_CS.1396582-B.

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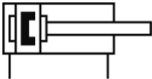
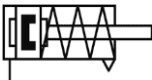
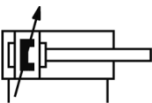
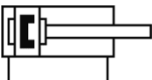
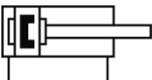
5 Release list overview

5.1 Pneumatic drives

5.1.1 Standard cylinders

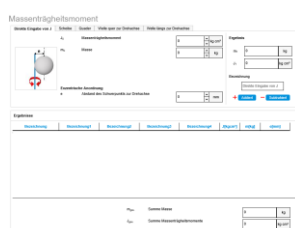
Standard lengths are used primarily, otherwise discuss with Aurobay.

PPS instead of PPV in terms cushions to DSBC, ADN and DSNU cylinders.

Name	Type	Remarks	Picture	Documentation
Compact cylinder ADN *For Foundry use include R8 vers. ADN-40-50-A-P-A-R8 	ADN-...	Diameter 12, 16, 20, 25, 32, 40, 50, 63, 80, 100, 125 mm Stroke length 1 ... 500 mm Force 51 ... 7363 N Double-acting Position sensing Cushioning fixed/self-adjusting		ADN (engb)
Compact cylinder AEN 	AEN-...	Diameter 12, 16, 20, 25, 32, 40, 50, 63, 80, 100 mm Stroke length 1 ... 25 mm Force 59 ... 4510 N Single-acting, pushing/pulling Position sensing Fixed cushioning		AEN (engb)
Standard cylinder DSBC 	DSBC-...-D3-PPVA-N3 DSBC-...-D3-PPSA-N3 Use Preferred! PPS is not for use with high force and speed!	Diameter 32, 40, 50, 63, 80, 100 mm Stroke length 1 ... 2800 mm Force 483 ... 4712 N Double-acting Position sensing Adjustable/self-adjusting cushioning - Plus: optional profile with additional sensor slots on three sides		DSBC (engb)
Standard cylinder DSNU, metric 	DSNU-...	Diameter 8, 10, 12, 16, 20, 25 mm Stroke length 1 ... 500 mm Force 19 ... 295 N Double-acting Position sensing Fixed/adjustable/self-adjusting cushioning		DSNU-ISO (engb)
Cylinder with holding brake DFLC 	DFLC-...	Diameter 40, 63, 100 mm Stroke length 10 ... 2000 mm Force: 754 ... 4712 N Double-acting Position sensing Adjustable cushioning		DFLC-DFLG (engb)

Mass moment of inertia

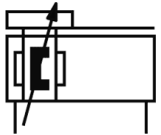
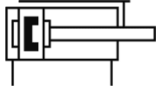
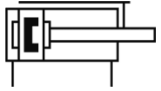
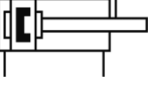
Juggling a pencil and calculator is a thing of the past. No matter whether disks, cuboids, slip-on flanges, grippers, etc.: This tool calculates all mass moments of inertia. Save, copy or print - and you're done.



Mass moment of inertia



5.1.2 Linear drives and slides

Name	Type	Remarks	Picture	Documentation
Linear drives DGC 	DGC-...	Diameter 8, 12, 18, 25, 32, 40, 50, 63 mm Stroke length 1 to 8500 mm Force 30 to 1870 N Position sensing Various different cushioning options possible Guide options - Basic design - Plain-bearing guide - Recirculating ball bearing guide		DGC (engb)
Mini slide SLS 	SLS-...	Diameter 6, 10, 16 mm Stroke length 5 ... 30 mm Force 17 ... 121 N Position sensing Fixed cushioning Recirculating ball bearing guide.		SLT-SLS-SLF (engb)
Mini slide DGST 	DGST-...	Size 6, 8, 10, 12, 16, 20, 25 Stroke length 10 ... 200 mm Force 25 ... 589 N Position sensing Fixed/adjustable cushioning Recirculating ball bearing guide, ball bearing cage guide (for sizes 20, 25)		DGST (engb)
Guided drives DFM, metric 	DFM-...	Diameter 12, 16, 20, 25, 32, 40, 50, 63, 80, 100 mm Stroke length 10 ... 400 mm Force 51 ... 4712 N Position sensing Fixed/adjustable cushioning Plain-bearing guide Recirculating ball bearing guide Variants available.		DFM (engb)
Mini slide DGSL, metric 	DGSL-...	Size 4, 6, 8, 10, 12, 16, 20, 25, 32 mm Diameter 6, 8, 10, 12, 16, 20, 25, 32 mm Stroke length 10 ... 200 mm Force 17 ... 483 N Position sensing Fixed/adjustable cushioning Ball bearing cage guide		DGSL (engb)
Guide units FENG, metric 	FENG-...	For Diameter 32, 40, 50, 63, 80, 100 mm Stroke length 10 ... 500 mm Plain-bearing guide Recirculating ball bearing guide.		FEN-FENG (engb)

Pneumatic drives

Pneumatic sizing

The pneumatic sizing application is a design tool that provides you with tailored calculations for the drive size you need for your pneumatic functional chains. You can size your drives by entering parameters such as the mass to be moved, the required travel time or the system operating pressure. Configure and compare pneumatic control chains quickly, easily and according to your exact needs. Once you have entered the application parameters, you will receive three calculations to compare: a precise result, one for optimum performance and one for the most environmentally friendly drive profile. The calculations also include information on compressed air consumption and CO2 emissions for the actual application. You can then automatically add the suggested and suitable pneumatic products to your shopping cart.



... Pneumatic sizing



Calculation flow rate

Information concerning the flow characteristics of pneumatic tubing and piping is essential not only for selecting the right component at the design stage, but also for the simulation and the validation of the different performances of a circuit. The determination of flow-rate characteristics is calculated according to ISO 6358.



... Calculation flow rate



5.1.3 Rotary drives

Name	Type	Remarks	Picture	Documentation
Semi-rotary drives DRVS	DRVS-...	Size 6, 8, 12, 16, 25, 32, 40 mm Torque 0.15 ... 20 Nm Swivel angle 90, 180, 270° Position sensing Fixed elastic cushioning elements on both sides		DRVS (engb)
Semi-rotary drives DRRD	DRRD-...	Size 8, 10, 12, 16, 20, 25, 32, 35, 40, 50, 63 mm Torque 0.2 ... 112 Nm Swivel angle 0 ... 180° Position sensing Cushioning: elastic (P), hydraulic shock absorbers Flanged shaft		DRRD (engb)

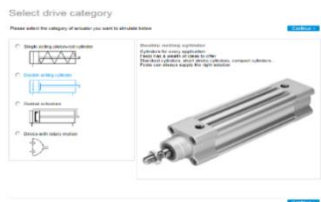
Pneumatic drives

5.1.4 Stopper and clamping cylinders

Name	Type	Remarks	Picture	Documentation
Stopper cylinder DFST	DFST-...	Diameter: 50, 63, 80 mm Stroke length: 30 ... 40 mm Permissible impact force on the advanced piston rod: 3000 ... 6000 N Position sensing Fixed cushioning Toggle lever		DFST (engb)
Stopper cylinders DFSP	DFSP-...	Diameter 16, 20, 32, 40, 50 mm Stroke length 5 ... 30 mm Permissible impact force on the advanced piston rod 880 ... 6280 N Position sensing Fixed cushioning Variants: trunnion, roller, non-rotating		DFSP (engb)
Clamping units KEC, KPE	KEC-... KPE-...	For round material 4, 6, 8, 10, 12, 16, 20, 25, 32 mm.		KP-KPE-KEC (engb)

Pneumatic simulation

Perfect simulations replace expensive reality tests! GSED helps select and configure the entire pneumatic control chain in the form of an expert system. When an input size is changed, the program automatically adjusts all other parameters.

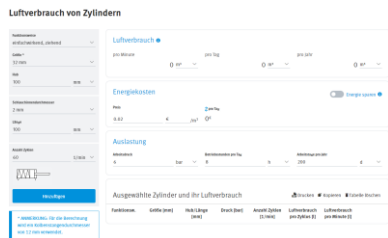


 Pneumatic simulation GSED



Cylinder Air Consumption

Determine the air consumption of your system quickly and easily.

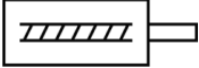


 Cylinder Air Consumption



5.2 Electromechanical drives

5.2.1 Electric cylinders

Name	Type	Remarks	Picture	Documentation
Electric cylinder ESBF 	ESBF-...	Size 32, 40, 50, 63, 80, 100 Stroke length 30 ... 1500 mm Force: 600 ... 17000 N Motor can be mounted using axial or parallel kit Linear drive with ball screw in Clean Design		ESBF (engb)
Electric cylinder EPCC	EPCC-...	Size 25, 32, 45, 60 Stroke length 25 ... 500 mm Force 75 ... 1000 N		Catalogue Documentation
Electric cylinder unit EPCE	EPCE-...	Drive with integrated electronics Complete solution for simple motion between mechanical end positions Size 45, 60 Stroke length 5 ... 80 mm Force 85 ... 150 N Toothed belt drive with plain-bearing guide		Catalogue Documentation
Electric cylinder unit EPCS	EPCS-...	Drive with integrated electronics Complete solution for simple movements between mechanical end positions Size 32, 45, 60 Stroke length 25 ... 250 mm Force: 150 ... 900 N Ball screw, with plain-bearing guide		Catalogue Documentation

Festo Automation Suite

The PC-based Festo Automation Suite software combines the parameterisation, programming and maintenance of Festo components in one program. It enables the entire drive package, from the mechanical system to the controller, to be commissioned. Perfect for making industrial automation simple, efficient and seamless.

Highlight:

- Only five steps to get a drive system up and running
- Greatly simplified integration into the control program
- Customisable through device-specific plug-ins and add-ons
- Integrated controller programming
- Access to device information and instructions directly from the software



 Festo Automation Suite



Handling guide online

Planning complex handling systems takes a lot of time. You can use the configurator "Handling Guide Online" (HGO) to design a customised handling system for your application in just a few steps.

You can choose from the following systems:

- Single-axis system
- 2D linear gantry
- 2D planar surface gantry
- 3D gantry
- 3D cantilever system

Advantages:

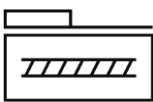
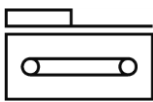
- Automatic selection of all relevant components
- Automatic design and calculation of the workload
- Quote created automatically
- CAD model available immediately
- Configuration-specific parameters for servo drives available immediately
- Complete Eplan project can be ordered according to the individual configuration
- Fully automated processing
- You can order fully or partially assembled systems through the Online Shop
- Lots of possible options



 Handling Guide Online



5.2.2 Linear axis and slides

Name	Type	Remarks	Picture	Documentation
Spindle axes EGC-BS 	EGC-...-BS	Size 70, 80, 120, 185 mm Stroke length 50 ... 3000 mm Force 300 ... 3000 N		EGC-BS (engb)
Spindle axes EGC-HD-BS	EGC-HD-BS-...	Size 125, 160, 220 Stroke length 50 ... 2400 mm Force 300 ... 1300 N.		Catalogue Documentation
Toothed belt axes EGC-TB 	EGC-...-TB	Size 50, 70, 80, 120, 185 mm Stroke length 50 ... 8500 mm Force 50 ... 2500 N		EGC-TB (engb)
Toothed belt axes EGC-HD-TB	EGC-HD-TB-...	Size 125, 160, 220 Stroke length 50 ... 5000 mm Force 450 ... 1800 N.		Catalogue Documentation

Release list overview

Electromechanical drives

Spindle axes ELGT-BS	ELGT-...	Sizes 90, 120, 160 max. stroke length 1500 mm Force 810 ... 1575 N Integrated recirculating ball bearing guide		Catalogue Documentation
Toothed belt axes ELGC-TB	ELGC-TB-...	Size 45, 60, 80 Max. stroke length: 2000 mm Force 75 ... 250 N Integrated recirculating ball bearing guide		Catalogue Documentation
Spindle axes ELGC-BS	ELGC-BS-...	Size 32, 45, 60, 80 Max. stroke length 1000 mm Force 110 ... 780 N Integrated recirculating ball bearing guide		Catalogue Documentation
Spindle axes ELGA-BS-KF	ELGA-BS-KF-...	Size 70, 80, 120, 150 Max. stroke length 3000 mm Force 300 ... 6400 N Integrated recirculating ball bearing guide		Catalogue Documentation
Toothed belt axes ELGA-TB-G	ELGA-TB-G-...	Size 70, 80, 120 Max. stroke length 8500 mm Force 350 ... 1300 N Integrated plain-bearing guide.		Catalogue Documentation
Toothed belt axes ELGA-TB-KF	ELGA-TB-KF-...	Size 70, 80, 120, 150 Max. stroke length 8500 mm Force 350 ... 2000 N Integrated recirculating ball bearing guide		Catalogue Documentation
Toothed belt axes ELGA-TB-RF	ELGA-TB-RF-...	Size: 70, 80, 120 Max. stroke length: 7400 mm Force 350 ... 1300 N Integrated roller bearing guide.		Catalogue Documentation
Toothed belt axis units ELGS-TB	ELGS-TB-...	Size 45, 60 Stroke length 200 ... 2000 mm Force 65 ... 75 N		Catalogue Documentation
Spindle axis units ELGS-BS	ELGS-BS-...	Size 32, 45, 60 Stroke length 100 ... 800 mm Force 40 ... 200 N		Catalogue Documentation
Toothed belt axis unit ELGE-TB	ELGE-TB-...	Size 35 Stroke length 50 ... 800 mm Force 50 N		Catalogue Documentation
Toothed belt axes ELGG	ELGG-...	Size 35, 45, 55 Stroke length 50 ... 1500 mm Force: 50 ... 350 N Recirculating ball bearing guide or plain-bearing guide.		Catalogue Documentation

Toothed belt axes ELGR	ELGR-...	Size 35, 45, 55 Stroke length 50 ... 1500 mm Force: 50 ... 350 N Recirculating ball bearing guide or plain-bearing guide.		Catalogue Documentation
Cantilever axis ELCC	ELCC-...	Size 60, 70, 90, 110 Stroke length max. 2000 mm Force 300 ... 2500 N Recirculating ball bearing guide		Catalogue Documentation
Mini-slides EGSC	EGSC-...	Size 25, 32, 45, 60 Stroke length 25 ... 200 mm Integrated recirculating ball bearing guide		Catalogue Documentation
Electric slide EGSK	EGSK-...	Size: 15, 20, 26, 33, 46 Stroke length: 25 ... 840 mm Force: 19 ... 392 N Recirculating ball bearing guide and ball screw		Catalogue Documentation
Mini slides EGSL	EGSL-...	Size 35, 45, 55, 75 Stroke length 50 ... 300 mm		Catalogue Documentation
Mini slide unit EGSS	EGSS-...	Size 32, 45, 60 Stroke length 25 ... 200 mm Force 60 ... 250 N		Catalogue Documentation

5.2.3 Electric stopper cylinders

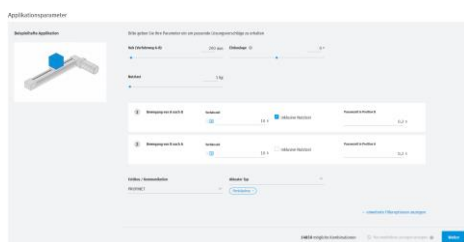
Name	Type	Remarks	Picture	Documentation
Stopper cylinders EFSD	EFSD-...	Size 20, 50, 100 Maximum load to be stopped 20, 50, 100 kg Position sensing using integrated sensors Adjustable cushioning, low maintenance LED status display		Catalogue Documentation

5.2.4 Rotary and lifting modules

Name	Type	Remarks	Picture	Documentation
ERMB rotary modules	ERMB-...	Size 20, 25, 32 mm Max. driving torque 0.7 ... 8.5 Nm Infinite rotation angle		ERMB (engb)
Rotary drive unit ERMS	ERMS-...	Size 25, 32 Peak torque 2.7 ... 5.6 Nm Rotation angles 90, 180°		Catalogue Documentation
Rotary actuators ERMO	ERMO-...	Size 12, 16, 25, 32 Nominal torque 0.15 ... 5 Nm Infinite rotation angle		Catalogue Documentation
Rotary gripper module EHMD	EHMD-...	Size: 40 Max. output torque 0.3 Nm Total stroke 10, 32 mm Stroke per gripper jaw 0 ... 16 mm Infinite rotation angle		Catalogue Documentation
Rotary/lifting modules EHMB	EHMB-...	Size 20, 25, 32 Max. drive torque 0.7 ... 6.7 Nm Working stroke 100, 200 mm Infinite rotation angle.		Catalogue Documentation

Electric motion sizing

Size your electric or electromechanical drive system quickly and easily – with Electric Motion Sizing. This design and simulation tool helps you to find the right combination of servo drive, motor and actuator for your application. The design for your drive is based on a few input parameters, such as mass, stroke/travel distance and cycle time. The calculation will show you suggestions as to which combination of electric drive and motor or servo drive, motor and mechanics is the most economical way to meet your needs. You can then automatically add the suggested products to your shopping basket.



 Electric motion sizing



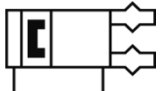
5.3 Motors and controllers

Name	Order code	Remarks	Picture	Documentation
Servo motors EMMT-AS	EMMT-AS-...	Size 60, 80, 100, 150, 190 Stall torque 0.66 ... 93.7 Nm Voltage 325 ... 680 V DC Nominal current 1.4 ... 20 A		Catalogue Documentation
EMME-AS servo motors	EMME-AS-...	Size 40, 60, 80, 100 Stall torque 0.18 ... 7.5 Nm Voltage 360 ... 565 V DC Nominal current 0.7 ... 4.1 A Suitable motor cable Suitable motor flange.		Catalogue Documentation
EMMS-ST stepper motor	EMMS-ST-...	Size 28, 42, 57, 87 Holding torque 0.09 ... 8.6 Nm Voltage 48 V DC Nominal current 1.4 ... 9.5 A Suitable motor cable Suitable motor flange.		Catalogue Documentation
Gear units EMGA	EMGA-...	Low backlash planetary gear unit for electromechanical drives Gear ratio $i = 3, 5, 8, 12, 20$, in stock Life-time lubrication Degree of protection: IP54		Catalogue Documentation
Servo drive CMMT-AS	CMMT-AS-...	Nominal voltage 230 ... 400 V AC Nominal current 2 ... 15 A Nominal power: 350 ... 6000 VA		Catalogue Documentation
Servo drive CMMT-ST	CMMT-ST-...	Voltage 24, 48 V DC Nominal current 8 A (peak 10A) Power up to 300W		Catalogue Documentation

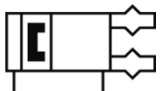
Grippers

5.4 Grippers

5.4.1 Parallel grippers

Name	Type	Remarks	Picture	Documentation
Parallel gripper HGPT 	HGPT-...	Size 16, 20, 25, 35, 40, 50, 63, 80 mm Stroke length 3 ... 20 mm per gripper jaw Force 53 ... 3150 N per gripper jaw Position sensing Sealing air connection.		HGPT-B (engb)
Parallel gripper HGPL 	HGPL-...	Size 14, 25, 40, 63 mm Stroke length 40 ... 150 mm per gripper jaw Force 79 ... 1371 N per gripper jaw Position sensing.		HGPL (engb)
Parallel gripper DHPS 	DHPS-...	Size 6, 10, 16, 20, 25, 35 mm Stroke length 2 ... 12.5 mm per gripper jaw Force: 13.5 ... 483 N per gripper jaw Position sensing Can be used as either a double-acting or single-acting gripper.		DHPS (engb)

5.4.2 Radial grippers

Name	Type	Remarks	Picture	Documentation
Radial gripper DHRS 	DHRS-...	Size 10, 16, 25, 32, 40 mm Opening angle 180° Total gripping torque 15 ... 725 Nm Position sensing With or without gripping force backup		DHRS (engb)

Simulation

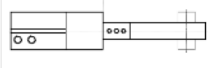
The correct selection of the gripper depends on the weight, the direction of movement, the distances, etc. The software tool immediately informs you which sizes of parallel, radial, angular, or three-point grippers can be used for the key figures you have entered.

Gripper selection

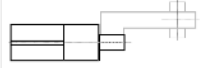
1. Information about object and gripper finger 2. Further settings 3. Degree of gripper utilization as a percentage

Application

☒ Gripping without eccentricity



☐ Gripping with eccentricity



Information about the object

Distance G-line -> center of gravity: 50 mm

Weight of the object: 200 g

Mass center offset: 5 mm

Data for a single gripper finger

Weight of one gripper finger: 25 g

Distance G-line -> center of gravity: 25 mm

Distance G-line -> gripping point: 40 mm

Next

Radial gripper

Parallel gripper



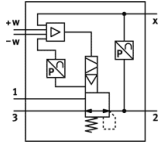
Valves

5.5 Valves

5.5.1 Standard valves

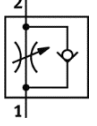
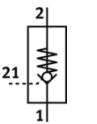
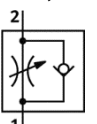
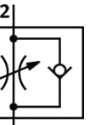
Name	Type	Remarks	Picture	Documentation
Standard valves VSVA with round plugs M12x1	VSVA-B-...-1R5L	Flow rate 400 ... 1400 l/min Voltage 24 V DC Sub-base valve Solenoid actuated, piloted Sub-bases.		ISO15407VSVA (engb) ISO5599VSVA (engb)
Valves VUVG, for individual connection	VUVG-...	Connection M3, M5, M7, G1/8 Push-in connector 3, 4, 6, 8 mm Flow rate 90 ... 780 l/min Voltage 5, 12, 24 V DC In-line valves, semi in-line valves, sub-base valves - Solenoid actuated, piloted - Pneumatic and mechanical spring return from the VG series		VTUG-G (engb)
Valves VMPA	VMPA-...	Port M7 Flow rate 230 ... 360 l/min Sub-base valve - Solenoid actuated - Signal status display with LED - Integrated current reduction Manifold blocks Manifold sub-bases.		TYP32 (engb) VMPA1 (engb)

5.5.2 Proportional valves

Name	Type	Remarks	Picture	Documentation
Proportional-pressure regulators VPPM 	VPPM-...	Connection: G1/8, G1/4 Flow rate: 380 ... 2750 l/min. Pressure regulators 3 selectable presets (fast, universal, precise) Optionally available display.		VPPM-G (engb)

Valve terminals

5.5.3 Flow control valves

Name	Type	Remarks	Picture	Documentation
One-way flow control valves 	VFOF-...	Flow rate: 0 ... 650 l/min. Shut-off valve		VFOF (engb)
Non-return valves, piloted HGL 	HGL-... Use only with manual override HAB!	Port M5, G1/8, G1/4, G3/8, G1/2 Flow rate 130 ... 1600 l/min Shut-off valve - Pneumatic piloted non-return valve		HGL (engb)
Manual override tools	HAB-...	Hand lever Manual overrides.		HGL (engb)
One-Way flow control valves (exhaust) GRxA, GRxZ 	GRLA-...	Connection M3, M5, G 1/8, G 1/4, G 3/8, G 1/2 Plug connector 3, 4, 6, 8, 10, 12 mm Flow rate 0 ... 1,400 l/min Non-return and flow control valve.		GR-VF (engb) GRX-VFO (engb)
In-line installation GR 	GR-... GRA-...	Connection M3, M5, G1/8, G1/4, G3/8, G1/2, G3/4 Push-in connector 3, 4, 6, 8 mm Flow 0 ... 3 300 l/min Non-return and flow control valve.		GRX-VFOI (engb)

5.6 Valve terminals

Name		Remarks	Picture	Documentation
MPA-S with CPX terminal type 32	MPA-...	Controlled via fieldbus or control block Max. 64 valve positions/max. 128 solenoid coils - Digital inputs/outputs - Analogue inputs/outputs - Parameterisation of inputs and outputs - Integrated convenient diagnostics system		TYP32-G (engb)
CPX electrical terminal type 50	CPX-...	Operating mode - Stand-alone - With valve terminal MPA Input/output modules Digital Analogue.		CPX (engb)

5.7 Vacuum technology

Name	Order code	Remarks	Picture	Documentation
OVEM vacuum generator, metric	OVEM-...	Nominal diameter 0.45 ... 2.0 mm -Plug connector QS6, QS8 Solenoid valve vacuum IN/OUT Solenoid valve for ejector pulse Integrated vacuum switch.		OVEM (engb)
Vacuum generators VN, pneumatic	VN-...	Nominal size 0.45 to 3 mm Connection -Plug connector QS4, QS6, QS8, QS10, QS12 -Thread M5, G1/8, G1/4, G3/8 -Push-in sleeve 4.6 mm Standard -Vacuum port 90° to supply port Inline -Vacuum port in line with supply port		VN (engb)
Suction cups VAS, VASB	VAS-... VASB-...	Suction cup size diameter 1 to 125 mm Connection - Male thread Round suction cup - Standard - Bellows, 1.5 convolutions		VAS (engb)

Vacuum design

This tool provides you with a product recommendation based on the requirements of your vacuum application. After entering a number of parameters, the tool will recommend the Festo products required to achieve the optimum solution.



 Vacuum design

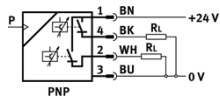


Sensors

5.8 Sensors

5.8.1 Pressure sensors

Name	Type	Remarks	Picture	Documentation
Pressure sensors SPAU	SPAU-...	Pressure measuring range -1 to 16 bar Voltage 20 ...30 V DC Switching output 2x PNP or 2x NPN selectable Electrical output 0.1 ... 10 V, 1 ... 5 V, 4 ... 20 mA Pneumatic connection G1/8, R1/8, R1/4, NPT1/8, M5, M7, push-in connector 4 mm, 6 mm, 5/32" Pressure switch Vacuum switch		SPAU (engb)
Pressure sensors SDE3	SDE3-... With analogue outputs preferred!	Pressure sensor Vacuum sensor Differential pressure measurement Illuminated LCD with optimised display		SDE3 (engb)

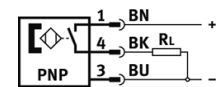
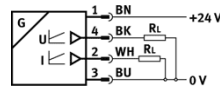


5.8.2 Air gap sensor

Name	Type	Remarks	Picture	Documentation
Air gap sensors SOPA	SOPA-...	Sensing range 20 ... 200 µm Pressure 4 ... 7 bar Switching outputs PNP or NPN Integrated air jet function Multi-coloured LCD display Filtered compressed air, lubricated or unlubricated H-rail, wall mounting, through-hole		SOPA (engb)

5.8.3 Proximity sensors

Name	Type	Remarks	Picture	Documentation
Position transmitter SMAT	SMAT-...	0 - 10 V, 0 - 20 mA Path measurement range 48 ... 52 mm Electric connection, 4-pin, M8x1 plug Design for T-slot		SMAT-8E (engb) SMAT-8M (engb)
Position transmitters SDAT	SDAT-...	Sensing ranges 50, 80, 100, 125, 160 mm 1x analogue output 4 ... 20 mA 1x programmable IO-Link®/switching output Electrical connection M8 Reproducibility < 0.1 mm		SDAT-MHS (engb)
Proximity sensor SMT-8M-A	SMT-8M-A-...	Voltage 5...30 V DC Cable length 0.1 ... 30 m Plug connection M8, M12 Electrical Contactless PNP Short design		SMX8 (engb)



5.9 Compressed air preparation

This program supports configuring an appropriate service unit. Please insert the required air cleanliness either by your application or an ISO-code or by direct selection of air filters.



Compressed air quality



Name	Type	Remarks	Picture	Documentation
Service units MS4	MS4-...	Port G1/8, G1/4, G3/8 Flow rate 550 ... 1500 l/min		MSB-FRC (engb) MS-COMBINATION (engb) MS-CONFIG-COMBINATION (engb) MS-LFR (engb) MS-FILTERS (engb) MS-REGULATORS (engb) MS-START-UP-EXHAUST-VALVES (engb) MS-FRM (engb)
Service units MS6	MS6-...	Port G1/4, G3/8, G1/2, G3/4 Flow rate 1900 ... 5100 l/min		MSB-FRC (engb) MS-COMBINATION (engb) MS-CONFIG-COMBINATION (engb) MS-LFR (engb) MS-FILTERS (engb) MS-REGULATORS (engb) MS-START-UP-EXHAUST-VALVES (engb) MS-FRM (engb) MS-SV (engb)
Service units MS9	MS9-...	Port G1/2, G3/4, G1, G1 1/4, G1 1/2 Flow rate 5100 ... 14000 l/min.		MS-CONFIG-COMBINATION (engb) MS-LFR (engb) MS-FILTERS (engb) MS-REGULATORS (engb) MS-START-UP-EXHAUST-VALVES (engb) MS-FRM (engb) MS-SV (engb)
Flow sensors SFAM	SFAM-... With analogue outputs preferred! Not allowed to take air from the FRM before the SFAM.	Flow measuring ranges - 10 ... 1000 l/min - 30 ... 3000 l/min - 50 ... 5000 l/min Switching output - 2x PNP Analogue output - 0 ... 10V - 4 ... 20mA		SFAM (engb)
Pressure regulators	MS...-LR-...	Port G1/8, G1/4, G3/8, G1/2, G3/4, G1, G1 1/4, G1 1/2 Flow rate 1000 ... 26500 l/min		MS-LR (engb)

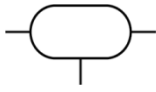
Precision pressure regulators	MS6-LRP-...	Port G1/4, G3/8, G1/2, G3/4 Flow rate 800 ... 5000 l/min		MS-LRP (engb)
Pressure gauges MAE	for MS4: for MS6	701608 MAE-MS4/6-10-BAR-RG 701609 MAE-MS4/6-16-BAR-RG 701611 MAE-MS6-10-BAR-RG 701612 MAE-MS6-16-BAR-RG		

[Samples of service units see page 41 to 44.](#)

5.10 Pneumatic fittings system

Name	Type	Remarks	Picture	Documentation
Plastic tubing PUN-H	PUN-H-...	Outside diameter: 2 ... 16 mm Internal diameter: 2.1 ... 11 mm Temperature-dependent operating pressure: -0.95 ... 10 bar Ambient temperature: -35 ... 60° C Operating medium - Compressed air - Vacuum - Water		OD-TUBING (engb)
Plastic tubing PAN	PAN-...	Outside diameter: 4 ... 16 mm Temperature-dependent operating pressure: -0.95 ... 19 bar Ambient temperature: -30 ... 80° C Operating medium - Compressed air - Vacuum		OD-TUBING (engb)
Quick Star push-in fittings, standard series QS	QS-...	Connection G 1/8, G 1/4, G 1/2, G 3/8 diameter 4, 6, 8, 10, 12, 16 mm screw connection - G thread with sealing ring suitable for a vacuum push-in fittings push-in bulkhead connectors push-in fittings with push-in sleeves blanking plugs multiple distributor		QS (engb)
Quick Star NPQM, metal, standard	NPQM-...	Connection M5, M7, G1/8, G1/4, G3/8, G1/2 Push-in connector 4, 6, 8, 10, 12, 14 mm Push-in sleeve 4, 6, 8, 10, 12 mm Threaded connection - G thread with sealing ring Push-in fittings Push-in connectors Push-in connectors with Fully metal design		NPQM (engb)

5.11 Other pneumatic equipment

Name	Type	Remarks	Picture	Documentation
Air Reservoirs CRVZS 	CRVZS-...	Volume: 0.1 ... 20 l Material: High-alloy stainless steel Equivalent to AD 2000.		AIR-RESERVOIRS (engb)
Silencers U 	U-...	Port thread M3, M5, G1/2, G1/4, G1/8, G3/8, G3/4, G1 Noise level 65 ... 84 dB(A)		SILENCERS (engb)
Silencers UC 	UC-...	Port thread M5, M7, G1/8, G1/4 Noise level 58 ... 68 dB(A)		SILENCERS (engb)
Tube holder NPAW	NPAW-...	Mounting attachment for guiding cables and hoses		CLIP-STRAPS (engb)

5.12 Safety products



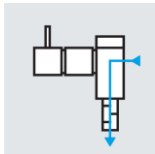
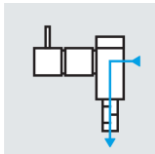
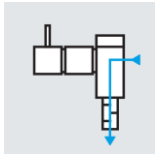
Safety device in accordance with the EC Machinery Directive certified by an independent testing institute

To control the components shown with a safe output with PL e, the CPX-FVDA-P2 can be used, for example

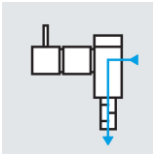
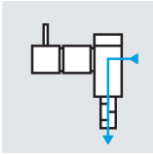
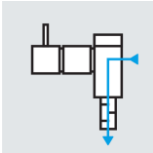
To record the signals from the components shown with a safe input up to PL e, the CPX-F8DE-P can be used, for example

5.12.1 Safety sub-functions that affect systems

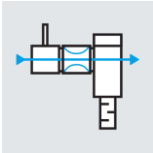
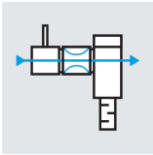
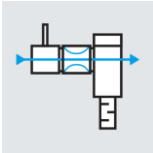
5.12.1.1 SDE - Safe de-energization up to PLe

Name	Order code	Picture	Documentation
Soft-start/quick exhaust valves MS6-SV 	MS6-SV-1/2-E-... 		MS-SV (engb)
Soft-start/quick exhaust valves MS6-SV 	MS6-SV-1/2-D-... 		MS-SV (engb)
Control blocks VOFA 	VOFA-L26-T32C-... 		VOFA (engb)

5.12.1.2 SDE - Safe de-energization up to PLC

Name	Order code	Picture	Documentation
Soft-start/quick exhaust valves MS6-SV 	MS6-SV-C-... 		MS-SV (engb)
Soft-start/quick exhaust valves MS9-SV 	MS9-SV-C-... 		MS-SV (engb)
On/off valves MS-EE 	MS4-EE MS6-EE MS9-EE MS12-EE 		MS-START-UP-EXHAUST-VALVES (engb)

5.12.1.3 SEZ - Safe energization up to PLC

Name	Order code	Picture	Documentation
Soft-start/quick exhaust valves MS6-SV 	MS6-SV-1/2-E-... 		MS-SV (engb)
Soft-start/quick exhaust valves MS6-SV 	MS6-SV-1/2-D-... 		MS-SV (engb)
Soft-start valves MS-DL 	MS4-DL MS6-DL MS12-DL		MS-START-UP-EXHAUST-VALVES (engb)

Safety products

5.12.1.4 PUS - Prevention of unexpected start-up up to PLe

Name	Order code	Picture	Documentation
Soft-start/quick exhaust valves MS6-SV	MS6-SV-1/2-E-...		MS-SV (engb)
Control blocks VOFA	VOFA-L26-T32C-...		VOFA (engb)

5.12.1.5 PUS - Prevention of unexpected start-up up to PLd

Name	Order code	Picture	Documentation
Soft-start/quick exhaust valves MS6-SV	MS6-SV-1/2-D-...		MS-SV (engb)

5.12.1.6 PUS - Prevention of unexpected start-up up to PLc

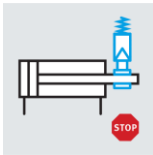
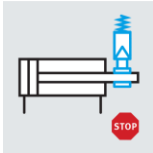
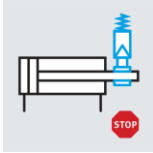
Name	Order code	Picture	Documentation
Soft-start/quick exhaust valves MS6-SV	MS6-SV-1/2-C-...		MS-SV (engb)

5.12.2 Safety sub-functions that affect drives

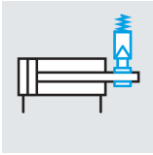
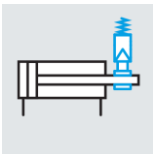
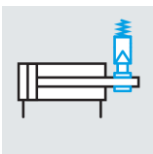
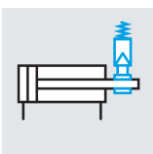
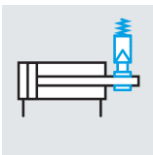
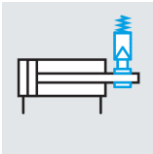
5.12.2.1 STO - Safe torque off up to PLe

Name	Order code	Picture	Documentation
Control blocks VOFA	VOFA-L26-T32C-...		VOFA (engb)

5.12.2.2 SSB - Safe stopping and blocking up to PLC

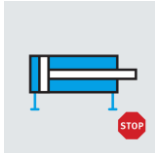
Name	Order code	Picture	Documentation
Holding brakes DACS 	DACS-... 		DACs (engb)
Cylinder with holding brake DFLC 	DFLC-... 		DFLC-DFLG (engb)
Cylinder with holding brake DFLG 	DFLG-... 		DFLC-DFLG (engb)

5.12.2.3 SB - Safe blocking (not part of VDMA) up to PLc

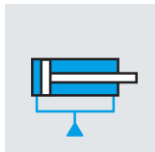
Name	Order code	Picture	Documentation
Clamping cartridges KP 	KP-...		KP-KPE-KEC (engb)
Clamping units KPE 	KPE-...		KP-KPE-KEC (engb)
ISO cylinder with clamping cartridge DSBC-C 	DSBC-...-C-...		DSBC (engb)
Compact cylinder with clamping cartridge ADN-KP 	ADN-...-KP-...		ADN (engb)
Round cylinders with clamping cartridge DSNU-KP 	DSNU-...-KP-...		DSNU (engb)
Linear drives DGC 	DGC-...-1H...-PN-...		DGC (engb) DGC-FA (engb)
Mini slide DGSL, metric 	DGSL-...-C-...		DADM-EP (engb) DGSL (engb)

Safety products

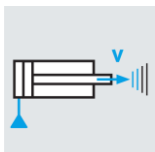
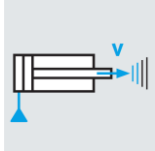
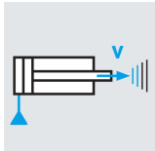
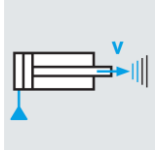
5.12.2.4 SSC - Safe stopping and closing up to PLC

Name	Order code	Picture	Documentation
Piloted check valves HGL 	HGL-...		HGL (engb)

5.12.2.5 SET - Safe equilibrium of torque up PLC

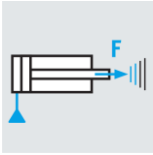
Name	Order code	Picture	Documentation
Pressure regulators MS-LR 	MS4-LR MS6-LR MS9-LR MS12-LR		MS-ACC (engb) MS-REGULATORS (engb)

5.12.2.6 SLS - Safely limited speed up to PLC

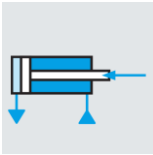
Name	Order code	Picture	Documentation
One-way flow control valves GRxA, GRxZ 	GRLA-... GRLZ-...		GRLA-GRLZ (engb)
Flow control valves GRLO 	GRLO-...		GRLO (engb)
In-line installation GRO 	GRO-...		GRO-VFFI (engb)
VFOF 	VFOF-LE-... VFOF-LE-BAH-..		VFOF (engb)

Safety products

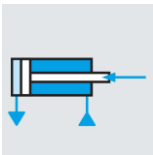
5.12.2.7 SLT - Safely limited torque (force) up to PLC

Name	Order code	Picture	Documentation
Pressure regulators MS-LR 	MS4-LR MS6-LR MS9-LR MS12-LR		MS-ACC (engb) MS-REGULATORS (engb)

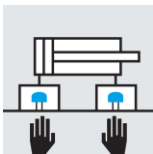
5.12.2.8 SDI - Safe direction up to PLe

Name	Order code	Picture	Documentation
Control blocks VOFA 	VOFA-L26-T52-... 		VOFA (engb)

5.12.2.9 SDI - Safe direction up to PLC

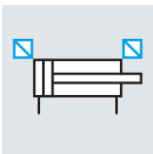
Name	Type	Picture	Documentation
Non-return valves H 	H-...		H-HA-HB (engb)

5.12.2.10 THC - Two-hand control up to PLC

Name	Order code	Picture	Documentation
Control block for two-hand start ZSB 	ZSB-1/-B 		ZSB (engb)

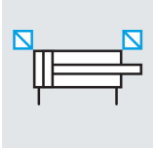
5.12.3 Monitoring safety sub-functions

5.12.3.1 SCA - Safe cam up to PLe

Name	Order code	Picture	Documentation
Proximity switch for T-slot SMT-8M-A 	SMT-8M-A-... (2 piece) 		SMT-8M-A (engb)

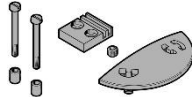
Safety products

5.12.3.2 SCA - Safe cam up to PLC

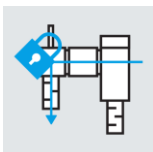
Name	Order code	Picture	Documentation
Proximity switch for T-slot SMT-8M-A 	SMT-8M-A-... plus SAMH-S-N8-... 		SMT-8M-A (engb) ESBF (engb)

5.12.4 Additional functions

5.12.4.1 Protection against tampering

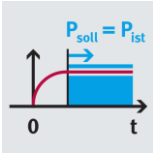
Name	Order code	Picture	Documentation
Pressure regulators MS-LR-AS 	MS4-LR-... AS MS6-LR-... AS MS9-LR-... AS MS12-LR-... AS		MS-ACC (engb) MS-REGULATORS (engb)
Sensor rails SAMH 	SAMH-S-N8-...		ESBF (engb)
Cover plates/cover caps/covers 	VAMC-S6-CH VAMC-S6-CS		TYP4445-G (engb)
Cover 	MS6-SV-C-MK MS9-SV-MK		MS-ACC (engb) MS-REGULATORS (engb) MS-SV (engb)

5.12.4.2 Lockout-tagout (LOTO) Reliable disconnection of the energy source

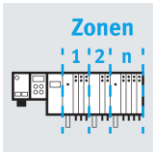
Name	Order code	Picture	Documentation
On/off valves MS-EM 	MS4-EM-... MS6-EM-... MS9-EM-... MS12-EM-...		MS-START-UP-EXHAUST-VALVES (engb)

Safety products

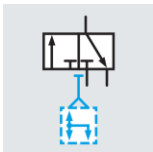
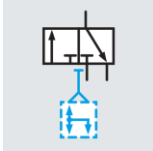
5.12.4.3 For protecting against unintentional pressure

Name	Order code	Picture	Documentation
Pressure regulators MS-LR 	MS4-LR MS6-LR MS9-LR MS12-LR		MS-ACC (engb) MS-REGULATORS (engb)

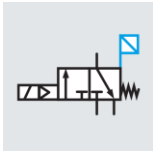
5.12.4.4 Creating zones

Name	Order code	Picture	Documentation
MPA-S with CPX terminal type 32 	MPA-...		TYP32-G (engb)

5.12.4.5 Valves with negative overlap (selection from the relevant product series)

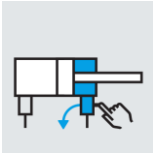
Name	Order code	Picture	Documentation
Standard valves VSVA with round plugs M12x1 	VSVA-B-...-1R5L		ISO15407VSVA (engb) ISO5599VSVA (engb)
Valves VMPA 	VMPA-...		TYP32 (engb) VMPA1 (engb)

5.12.4.6 Valves with switching position monitoring

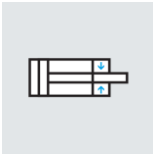
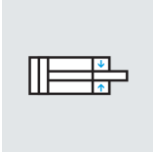
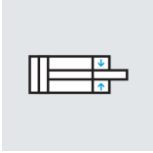
Name	Order code	Picture	Documentation
Standard valves VSVA, plug-in 	VSVA-B-M52-...-APx VSVA-B-M52-...-ANx		TYP4445-G (engb)

Safety products

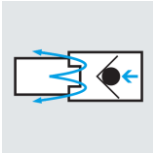
5.12.4.7 Releasing trapped persons

Name	Order code	Picture	Documentation
Cover caps for manual override 	HAB-...		HGL (engb)

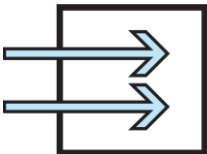
5.12.4.8 End-position locking

Name	Order code	Picture	Documentation
Compact cylinder ADN-EL 	ADN-...-ELx-...		ADN (engb)
Standard cylinder DSBC 	DSBC-...-E1-...		DSBC (engb)
Mini slide DGSL, metric 	DGSL-...-E3-...		DGSL (engb)

5.12.4.9 Safety coupling

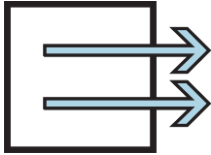
Name	Order code	Picture	Documentation
Coupling sockets NPHS 	NPHS-D6-P-... NPHS-D6-M-...		QUICK-COUPPLINGS (engb)

5.12.4.10 Safe inputs

Name	Order code	Picture	Documentation
Input module for CPX terminal 	CPX-F8DE-P 		CPX (engb)

Safety products

5.12.4.11 Safe outputs

Name	Order code	Picture	Documentation
Output module for CPX terminal 	CPX-FVDA-P2 		CPX (engb)

What must be taken into account when using Festo products?

The limit values specified in the technical data and any specific safety instructions must be adhered to by the user in order to comply with the intended use.

When using pneumatic components, ensure that they are operated using correctly prepared compressed air without aggressive media and that they comply with environmental specifications (e.g., climate). These can be found in the catalogue data sheet and in the general conditions of use.

The relevant national regulations, directives, and applicable standards as well as occupational health and safety laws must always be adhered to when using Festo products in safety-related applications.

Unauthorised conversions or modifications to products and systems from Festo constitute a safety risk and are thus not permitted. Festo does not accept any liability for the resulting damages.

You should contact Festo if one of the following applies to your application:

- The ambient conditions and conditions of use or the operating medium differ from the specified technical data.
- The product is to perform a safety function.
- A risk or safety analysis is required.

All technical data is correct at the time of going to print.

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All technical data is subject to change according to technical updates.

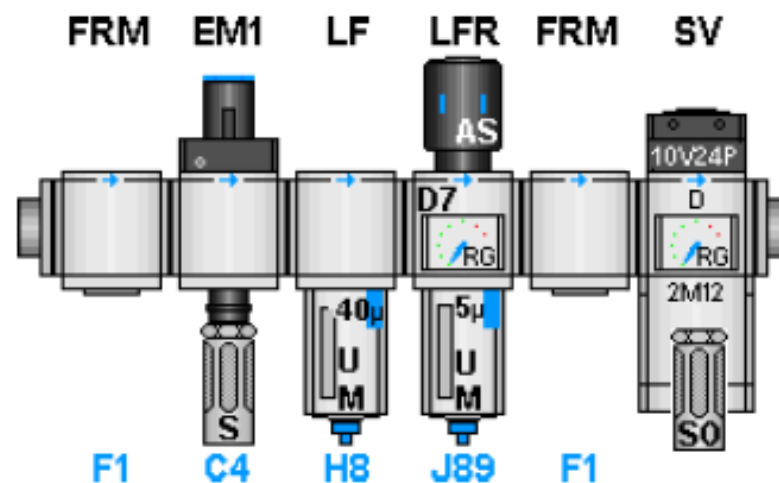
6 Service Units - Details

6.1 Service Unit 1 – G3/4"

Size: G 3/4"

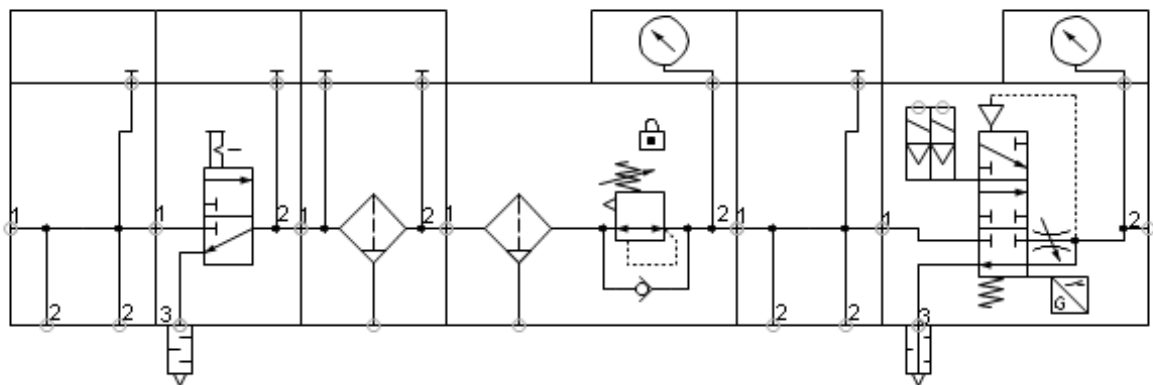
Order number: Systemtechnic Project Number SE_CS.1482619-D
Enter this number when ordering!

Configuration:



This service unit has performance level PLd.

Pneumatic diagram:



Service Units - Details

Service Unit 1 – G3/4”

Parts List:

Pos.	Quantity	Description	Type	Part number
Systemtechnic Project Number SE_CS.1482619-D:				
1	1	Service unit combination	MSB6-AGE:C4:H8:J89:F1-WP	531030
2	1	Soft start and exhaust valve	MS6-SV-1/2-D-10V24P-2M12-AD3	548713
3	1	Silencer	UOS-1-LF	1901207
4	1	Adapter	MS6-MV1	8119204
5	4	Blanking plug	B-1/2	3571
6	1	Pressure gauges set	MAE-MS6-10-BAR-RG	701611
		Service unit consists of:		
		On-off valve with silencer	MS6-EM1-1/2-S	541268
		Filter, 40 µm, metal bowl, manual condensate drains	MS6-LF-1/2-EUM	529619
		Filter regulator, 0.5 ... 12 bar, 5 µm, metal bowl, manual condensate drain, integrated pressure gauge with red/green scale, can be locked using accessories	MS6-LFR-1/2-D7-C-U-M-RG-AS	526490
		Branching module	MS6-FRM-1/2	529853

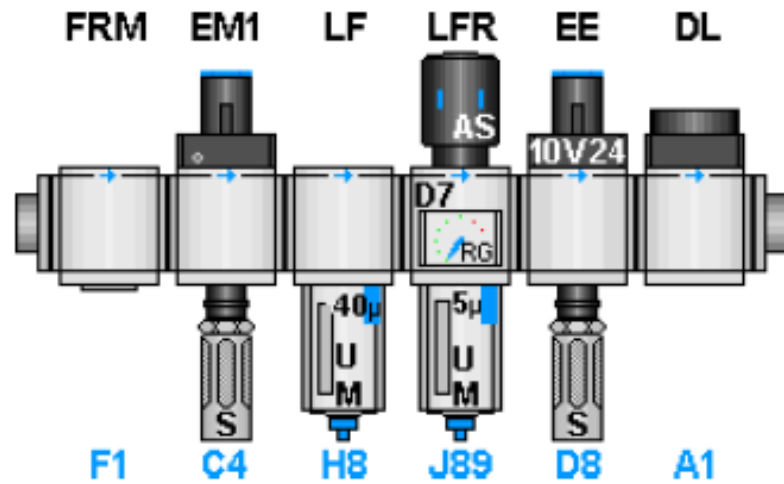
This service unit is also available in performance level PLe with project number SE_CS.1396582-B

6.2 Service Unit 2 – G3/8"

Size: G 3/8"

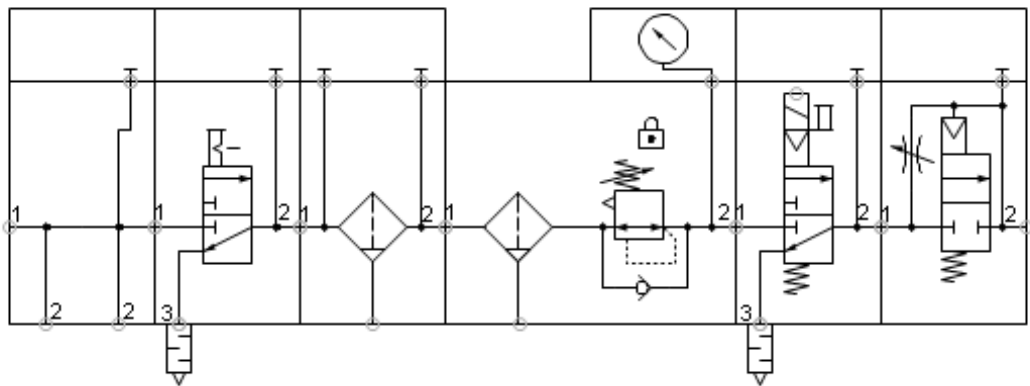
Order number: Systemtechnic Project Number SE_CS.1396583-C
Enter this number when ordering!

Configuration:



Safety category PLC

Pneumatic diagram:



Service Units - Details

Service Unit 2 – G3/8”

Parts List:

Pos.	Quantity	Description	Type	Part number
Systemtechnic Project Number SE_CS.1396583-C:				
1	1	Service unit combination	MSB4-AGC:F1:C4:H8:J89:D8:A1-WP	531029
3	1	Plug socket with cable	KMEB-1-24-5-LED	151689
4	2	Blanking plug	B-1/4	3569
		Service unit consists of		
		Branching module	MS4-FRM-1/4	529555
		On-off valve with silencer	MS4-EM1-1/4-S	541259
		Filter, 40 µm, metal bowl, manual condensate drains	MS4-LF-1/4-EUM	535660
		Filter regulator, 0.5 ... 12 bar, 5 µm, metal bowl, manual condensate drains, integrated pressure gauge with red/green scale, can be locked using accessories	MS4-LFR-1/4-D7-C-U-M-RG-AS	526489
		On-off valve, electrical, 24 V, with silencer, 10 bar	MS4-EE-1/4-10V24-S	542598
		Soft-start valve, pneumatic	MS4-DL-1/4	529531

7 Alphabetically list of approved products

ADN-.....	12	ERMB-.....	20
ADN-...-ELx-.....	39	ERMO-.....	20
ADN-...-KP-.....	34	ERMS-.....	20
AEN-.....	12	ESBF-.....	16
CMMT-AS-.....	21	FENG-.....	13
CMMT-ST-.....	21	GR-.....	24
CPX-.....	24	GRA-.....	24
CPX-F8DE-P	39	GRLA-.....	24, 35
CPX-FVDA-P2	40	GRLO-.....	35
CRVZS-.....	29	GR LZ-.....	35
DACS-.....	33	GRO-.....	35
DFLC-.....	12, 33	H-.....	36
DFLG-.....	33	HAB-.....	24, 39
DFM-.....	13	HGL-.....	24, 35
DFSP-.....	15	HGPL-.....	22
DFST-.....	15	HGPT-.....	22
DGC-.....	13	KEC-.....	15
DGC-...-1H-...-PN-.....	34	KP-.....	34
DGSL-.....	13	KPE-.....	15, 34
DGSL-...-C-.....	34	MAE-MS4/6-10-BAR-RG.....	28
DGSL-...-E3-.....	39	MAE-MS4/6-16-BAR-RG.....	28
DGST-.....	13	MAE-MS6-10-BAR-RG	28
DHPS-.....	22	MAE-MS6-16-BAR-RG	28
DHRS-.....	22	MPA-.....	24, 38
DRRD-.....	14	MS-...-LR-.....	27
DRVS-.....	14	MS12-DL	31
DSBC-...-D3-PPSA-N3	12	MS12-EE.....	31
DSBC-...-D3-PPVA-N3	12	MS12-EM-.....	37
DSBC-...-C-.....	34	MS12-LR-.....	35, 36, 38
DSBC-...-E1-.....	39	MS12-LR... AS	37
DSNU-.....	12	MS4-.....	27
DSNU-...-KP-.....	34	MS4-DL	31
EFSD-.....	19	MS4-EE.....	31
EGC-...-BS	17	MS4-EM-.....	37
EGC-...-TB	17	MS4-LR.....	35, 36, 38
EGC-HD-BS-.....	17	MS4-LR-... AS.....	37
EGC-HD-TB-.....	17	MS6-.....	27
EGSC-.....	19	MS6-DL	31
EGSK-.....	19	MS6-EE.....	31
EGSL-.....	19	MS6-EM-.....	37
EGSS-.....	19	MS6-LR.....	35, 36, 38
EHMB-.....	20	MS6-LR... AS	37
EHMD-.....	20	MS6-LRP.....	28
ELCC-.....	19	MS6-SV-1/2-C-.....	32
ELGA-BS-KF.....	18	MS6-SV-1/2-D-.....	30, 31, 32
ELGA-TB-G-.....	18	MS6-SV-1/2-E-.....	30, 31, 32
ELGA-TB-KF-.....	18	MS6-SV-C-.....	31
ELGA-TB-RF-.....	18	MS6-SV-C-MK.....	37
ELGC-BS-.....	18	MS9-.....	27
ELGC-TB-.....	18	MS9-EE.....	31
ELGE-TB-.....	18	MS9-EM-.....	37
ELGG-.....	18	MS9-LR.....	35, 36, 38
ELGR-.....	19	MS9-LR... AS	37
ELGS-BS-.....	18	MS9-SV-C-.....	31
ELGS-TB-.....	18	MS9-SV-MK.....	37
ELGT-.....	18	NPAW-.....	29
EMGA-.....	21	NPHS-D6-M-.....	39
EMME-AS-.....	21	NPHS-D6-P-.....	39
EMMS-ST-.....	21	NPQM-.....	28
EMMT-AS-.....	21	OVEM-.....	25
EPCC-.....	16	PAN-.....	28
EPCE-.....	16	PUN-H-.....	28
EPCS-.....	16	QS-.....	28

Alphabetically list of approved products

SAMH-S-N8.....	37	VAS-.....	25
SDAT-.....	26	VASB-... ..	25
SDE3-.....	26	VFOF-.....	24
SE_CS.1396583-C.....	43	VFOF-LE-... ..	35
SE_CS.1482619-D	41	VFOF-LE-BAH-... ..	35
SFAM-.....	27	VMPA-.....	23, 38
SLS-.....	13	VN-... ..	25
SMAT-.....	26	VOFA-L26-T32C-.....	30, 32
SMT-8M-A-.....	26, 36, 37	VOFA-L26-T52-... ..	36
SOPA-.....	26	VPPM-... ..	23
SPAU-... ..	26	VSVA-B-...-1R5L.....	23, 38
U-... ..	29	VSVA-B.M52-...-ANx	38
UC-... ..	29	VSVA-B-M52-...-APx	38
VAMC-S6-CH.....	37	VUVG-.....	23
VAMC-S6-CS.....	37	ZSB-1/-B	36

8 Service and support from Festo

8.1 Machine safety in automation technology

You may well have realised that even the best components leave you with uncertainty if it is not clear how to design and operate the machine safely and correctly.

This may be, for example, because there are no application notes. Or because important figures are missing from the datasheet.

That is why we provide advice and help you to implement your machine safely, with minimal effort and in line with the EC Machinery Directive, regardless of whether you choose pneumatic or electric drive technology.

8.1.1 Electric drive safety

Depending on where you sell your products, there are many different legal requirements that apply to your electric drives and motor controllers.

These include the EC Machinery Directive 2006/42/EC or the EN ISO 13849 series of standards. In practice, however, design engineers are mainly faced with two difficulties: either there is uncertainty about which regulation applies, or it is unclear whether the regulation is applicable for the chosen solution.

But this can be clarified. We can provide you with extensive support and practical information, application notes and technical FAQs, no matter what the particular product is.

And our experts are always happy to help.



Electric drive safety



8.1.2 Pneumatic safety

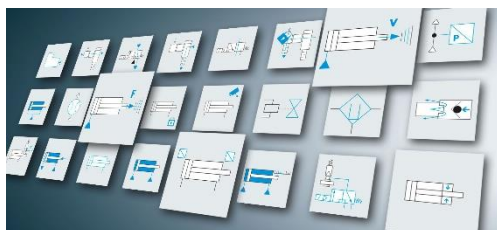
Safe pneumatic drive technology for the required outcome

In practice, the topic of safety relating to pneumatic components should always be considered, with technical documentation and risk assessments determining its importance. The EC Machinery Directive 2006/42/EC is the definitive fundamental guideline for the functional safety of machines, and the harmonised standard EN ISO 13849 is also relevant. The good news is that Festo can provide expert support on all safety-related topics. As well as advice, we also offer precise application notes for our solutions.

Pneumatics with safety service

Festo offers a wide range of individual pneumatic components that need to be assessed as part of the system. It is not like electrics where you work with certified components; instead, the functional safety of a specific pneumatic application usually needs to be designed and built with common hardware components. In this case, it is the machine manufacturer's responsibility to provide the safety-related evaluation and documentation.

Safety-related pneumatics is anything but trivial, which is why we provide our products with all the relevant data as standard. What's more, our project engineers are on hand to offer you expert advice until you are up to date with what is required, for example by going through the Failure Mode and Effects Analysis with you. This service provides you with a quicker and more cost-effective way to ensure your system is safe.



Pneumatic safety



8.2 Automation in Industry 4.0

Your opportunities for the future are promising: since the Industrial Revolution, the prospects for industrial companies have never been better. A smart factory with digitally connected production systems, the Internet of Things, big data, cobots and other cyber-physical systems (CPS) all make tremendous productivity increases possible – and you have already found the right technology partner.

Industry 4.0 in practice

Flexible, simple, reliable, and extremely productive, Industry 4.0 brings together Festo's various areas of expertise and offers a wide variety of advantages for your production. We will provide you with an overview of the areas where you can prepare for Industry 4.0 and show you solutions, practical examples, and suitable products.



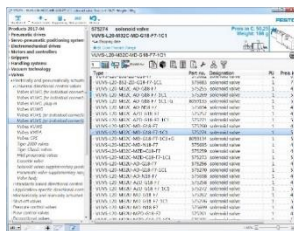
Industry 4.0



8.3 Conceptualise and design

8.3.1 Quick Search Plus – quickly find product information

The complete catalogue in the digital version: This smart software combines all of Festo's online tools and Windows tools under one roof. You get online access to all product information including CAD data, marking of the core program components, etc. The shopping cart and our tools for selection and dimensioning are just a click away. This already works from Windows 7.

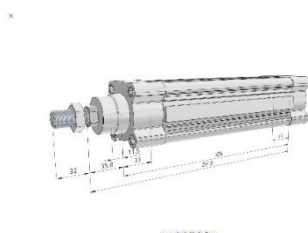


Quick Search Plus



8.3.2 CAD data and models directly in the catalogue

You can find the relevant CAD data and CAD models for the products directly in the catalogue. Simply click on the CAD icon and select the file in the desired format. With the practical insert function, you can immediately transfer models online to your CAD system without having to save them temporarily. This requires the installation of the Java Runtime Environment 6 or higher and the CAD system must be installed on the local computer.

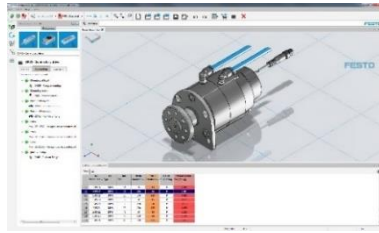


CAD data



8.3.3 Festo Design Tool 3D – configuring modules

With this 3D product configurator, you can create modules using Festo products quickly, accurately and intuitively in your CAD format. This ensures that components and accessories are compatible, you work with straightforward bills of materials, and end up with clear documentation. And, last but not least, you can also order the module directly and, if required, fully pre-assembled. The tool generates a separate order code for this.

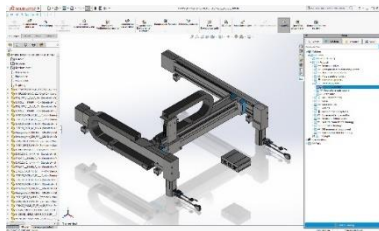


→ Festo Design Tool 3D



8.3.4 Festo PARTdataManager – all CAD data in 2D/3D

With this comprehensive stand-alone tool, you have 2D and 3D models for more than 33,000 products at your fingertips quickly and easily – in 45 CAD formats and with interfaces to popular design programs. This works with a simple full-text search as well as with a geometric search based on an imported 3D model. The PARTdataManager can be used with or without a connection to the product catalogue on DVD. The included online update function keeps you up to date at all times.



→ Festo PARTdataManager



8.3.5 EPLAN macros – design made easy

We provide EPLAN macros for more than 38,000 of our products in 21 languages in order to create electrical circuit diagrams in the CAE software EPLAN Electric P8 and fluid engineering circuit diagrams in EPLAN Fluid.

Individual macros on the EPLAN Data Portal

Individual macros for Festo products can be conveniently found in the EPLAN Data Portal using the relevant part number or type code:

→ Festo products in the EPLAN Data Portal

Complete EPLAN projects for complex products

The manual documentation of a complex product like a valve terminal is time-consuming and can lead to mistakes. In order to simplify and speed up this process, Festo provides a web service that automatically generates a correctly configured EPLAN project from the individual configuration of a product with the order code:

→ Schematic solution in the Festo App World

Easy-to-understand video tutorials on our YouTube channel explain the process:

1. → Generating an EPLAN valve terminal project in the Festo App World
2. → Integrating the valve terminal project into an existing project design
3. → Connecting the valve terminal and assigning functions

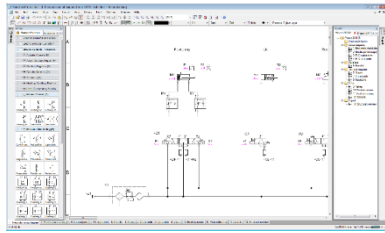


→ EPLAN macros



8.3.6 FluidDraw – intelligent circuit diagram creation

FluidDraw is an indispensable design software for electrical and pneumatic circuit diagrams that makes it easier to plan complete systems as well as implement individual components. When using the software, you can access the Festo catalogue as well as imported databases and work with DIN-compliant symbol libraries, evaluation functions and assembly plans. The result is reliable, complete and standardised circuit diagrams.



FluidDraw



8.4 Procure and deliver

8.4.1 Festo online shop

Efficient purchasing in the Festo Online Shop

The convenient product selection process guides you to the right product quickly and reliably. Practical filter functions, intuitive operation and the valuable information in the selection aid make selecting products especially easy. Recommended accessories are displayed visually on the product page.

Registered customers can see prices and availability, can conveniently access information from previous orders, import bills of materials, share shopping baskets and easily download documents such as order confirmations, delivery notes and invoices. Thanks to seamless order and shipment tracking, you can keep an eye on all the delivery dates at all times, which means maximum planning reliability, even for orders placed outside the Online Shop.

What is especially advantageous is that the Festo Online Shop is fully compatible with all mobile devices so that, for example, your maintenance staff can select and order the required products on site directly from their mobile phone.

You can activate all the features of the Festo Online Shop by simply registering. This gives you access to the complete product portfolio, as well as useful information, tools and services.



Festo Online Shop



8.4.2 App World

The Festo App World stands for the sale of apps, cloud products and other software libraries. As a customer, you have the opportunity to buy directly online and view the relevant apps for your hardware using your product key.

Your advantages

- Log in _ log in to Festo using your existing login
- Order and receive directly _ Her digital product
- View your App World order history a - fast, convenient and transparent



App World



8.5 Assemble and commission

8.5.1 Commissioning service

Do you need to reduce the workload of your staff and want help with commissioning our products and solutions? Our local service specialists are available worldwide to assist you with on-site assembly, installation and commissioning.

Our commissioning service includes:

- Configuration and parameterisation
- Trial operation and optimisation
- Data backup and documentation
- Technical instructions and briefing of operating staff.

Simply order the commissioning service with the relevant product or contact us.



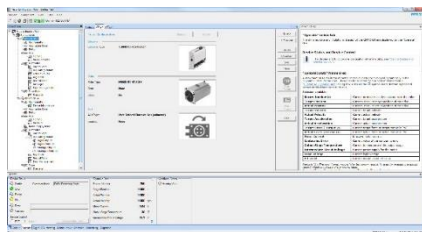
 Commissioning service



8.5.2 Festo Configuration Tool – parameterising components

The Festo Configuration Tool (FCT) provides a clear overview of all the drives in a system. With our configuration and commissioning software, you can move axis systems step by step or in sequences, write individual records for the positioning set table using the teach-in method and apply trace functions. FCT runs offline in the office as well as online directly on the machine for parameterising positioning options and for diagnostics.

Product-specific plug-ins can be found on the relevant product detail page under 'Downloads and media' in the Software section. Enter the part number or order code in the search field or navigate to the right page via the product selection.

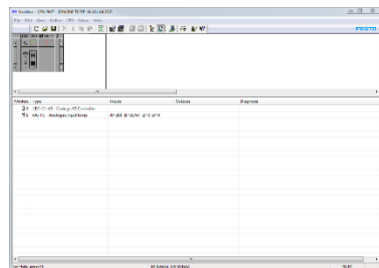


 Festo Configuration Tool FCT



8.5.3 Festo Maintenance Tool FMT – configure CPX modules

The easiest way to commission, configure and extend diagnostics of CPX valve islands is with the CPX-FMT. When using Industrial Ethernet fieldbus nodes such as Ethernet/IP, ProfiNet and Modbus/TCP, the maintenance tool communicates directly with the CPX terminal. With classic fieldbuses, the software is connected to the CPX terminal via a USB adapter (type NEFC-M12G5-0.3-U1G5).

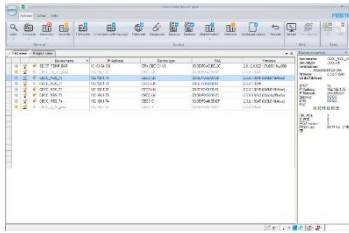


 Festo Maintenance Tool



8.5.4 Festo Field Device Tool – setting up field devices

The Festo Field Device Tool is like a Swiss army knife for service and commissioning: a practical software tool that provides various functions for all Ethernet-based field devices from Festo, including CPX control blocks with associated valve terminals, CECC controllers and motor controllers, as well as for camera systems. It enables you to find all Festo devices in the network and then easily and conveniently check and update the firmware.



... Festo Field Device Tool



8.5.5 Festo Service2See! – Simple self-help video tutorials

See and understand: On our YouTube channel Festo Service, you will find practical and user-friendly video tutorials on topics that are the subject of frequently asked questions in the areas of maintenance, commissioning and repair. The videos are an ideal addition to our technical hotline, because pictures say more than 1000 words, especially when they are moving images. And around the clock!

Useful information about which tools you need, how to use them and how much time you need to spend are also included, as are image comparisons that point out typical sources of error. Ideally, you have a tablet or smartphone at hand that you can use to show you the correct steps to take directly on the machine.



... Service2see



8.5.6 Programming services

The more complex the automation solution, the earlier you should involve specialists. We support you with the integration of our products into your control concept with suitable function blocks and device description files. On request, our specialists can program the application according to your requirements.



... Programming service



8.6 Operate and modernize

8.6.1 Festo Energy Saving Services

High energy prices, rising cost pressure and a growing awareness of climate protection have undoubtedly made industrial energy efficiency a key activity in your business. Festo Energy Saving Services according to DIN EN ISO 11011 offer you a tailor-made range of services that enable you to identify and utilise potential compressed air savings in an optimal, integrated and sustainable way.



Energy Saving Services



8.6.2 Spare parts for Festo products

You can quickly find the right spare part by using the part number, order code, type, product key or the scanned data matrix code. You will then see all the available spare parts in the smart spare parts catalogue and can place the part you need in the shopping basket. Interactive close-up views help during the selection process. We also provide repair and installation instructions as well as an overview of the matching accessories.



Spare parts for Festo products



8.6.3 Festo repair service

Repairs are particularly recommended for high-value components and modules that have not yet reached the end of their service life. We take care of this for you – quickly, reliably and professionally. Our worldwide range of services also includes inspections and economic feasibility analyses, leakage tests for pneumatic components and functional tests.



Repair service



8.6.4 Rapid support in an emergency

You can rely on us in the event of an emergency, either remotely via telephone or desktop sharing or directly on site. We read out and analyse warning and error messages and identify and eliminate the causes of faults. Take advantage of our expertise and our service technicians' many years of experience. They not only perform all necessary immediate measures on site, they also provide you with valuable information on system optimisation.



On-site services



8.6.5 Maintenance service

Our specialists ensure optimal machine operation by inspecting your system for damage and wear and professionally carrying out all necessary maintenance work in accordance with DIN 31051 - from filter replacement to timing belt replacement.



... Maintenance management



8.7 Festo Didactic

Maximising learning success and productivity

We are the world's leading provider of technical education. As a global partner for educational institutes, governments, public institutions and companies, we design and establish training centres and laboratories, as well as learning systems and training programmes. We systematically prepare skilled professionals for working in dynamic and complex environments.



... Technical education



Added value for industry and vocational education

In addition to training and consulting services for industrial companies, we also offer skills development for basic and further training. This is how we ensure that the requirements of tomorrow's industry are already reflected in training today. In addition, we support you with an extensive range of training courses and comprehensive training and consulting concepts.

Further training by the industry, for the industry

Lifelong learning and skills development for employees are absolutely critical to meeting industrial challenges. We are the perfect partner for courses on technical and organisational issues, courses on soft skills as well as on the preparation for digital transformation.



... Training and consulting



Notes



You are always in the fast lane.
You create technological trends.
We set your machines in motion.

→ **WE ARE THE ENGINEERS
OF PRODUCTIVITY.**